

Notice of Allowability

Application No.

09/843,924

Examiner

Beth E. Owens

Applicant(s)

SAKURAI ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed 9 July 2004.
2. ☒ The allowed claim(s) is/are 3,4,6,7,9-27 and 31-34.
3. ☒ The drawings filed on 30 April 2001 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

RICHARD ELMS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Examiner's Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to Applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

In the Amended Claims:

Claims 6, 7, 9, 10, 11, 12, 13, 14, 16 and 17, line 8: insert --the metal layer including a first metal layer and a second metal layer formed on the first metal layer,-- before "the second".

2. Authorization for this examiner's amendment was given in a telephone interview with Tarik Nabi on July 26, 2004.

Allowance

3. Claims 3, 4, 6, 7, 9-27 and 31-34 are allowed.

4. The following is an examiner's statement of reasons for allowance:

There is no prior art available nor obvious motivation to combine elements of prior art which teach a method for forming a bump, comprising: forming a resist layer that defines a through hole which overlaps at least a portion of a pad covered with an insulating film; forming an opening in the insulating film after forming the resist layer, the opening exposing at least a part of the pad; and forming a metal layer constituting a bump in the opening

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after forming the opening, the metal layer connected to the portion of the pad exposed in the opening, the insulating film being thicker at the periphery of the pad than at the center of the pad;

and:

A method for forming a bump, comprising: forming a resist layer that defines a through hole which overlaps at least a portion of a pad covered with an insulating film: forming an opening in the insulating film after forming the resist layer, the opening exposing at least a part of the pad; and forming a metal layer constituting a bump in the opening after forming the opening, the metal layer connected to the portion of the pad exposed in the opening, the metal layer including a first metal layer and a second metal layer formed on the first metal layer, the second metal layer being formed on the first metal layer, and:

the opening being formed so as to be larger than a periphery of the through hole so as to define a region upon which to form the first metal layer and to leave an exposed portion of the pad, the second metal layer being formed so as to cover the exposed portion of the pad;

or:

the first metal layer being formed in the through hole, the resist layer being removed, and then the second metal layer being formed so as to cover the first metal layer;

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or:

the first metal layer being formed so as to protrude from the through hole so that the first metal layer has a tip having a width which is larger than a width of the through hole;

or:

the second metal layer being formed so as to protrude from the through hole so that the second metal layer has a tip having a width which is larger than a width of the through hole;

or:

the first metal layer being formed by electroless plating;

or:

the second metal layer being formed by electroless plating;

or:

further comprising the step of providing a solder on the metal layer;

or:

the first metal layer being formed in the through hole, and then the second metal layer being formed on the first metal layer without removing the resist layer, and the upper surface of the first metal layer being formed so as to be lower than the upper surface of the resist layer, and the second metal layer being provided by a printing process using the resist layer as a mask;

or:

the first metal layer being formed in the through hole, and then the second metal layer being formed on the first metal layer without removing the resist layer, and further including the step of forming a conductive film on the insulating material so as to be electrically connected to the first metal layer at the periphery of the through hole, the upper surface of the first metal layer being formed so as to be lower than the upper surface of the resist layer, and the second metal layer being provided by electroplating using the conductive film as an electrode.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Beth E. Owens, Ph.D. whose telephone number is 571.272.1882 and fax number for unofficial communications is 571.273.1882.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms, can be reached on 571.272.1869. The

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fax phone number for the organization where this application or proceeding is assigned is 703.872.9306 for official communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571.272.2800.

A handwritten signature in black ink, appearing to be the letters "BEO" in a cursive, stylized font.

BEO 07.26.04